A NEW COMPOSITE JUVENILE SPECIMEN OF *AUSTRALOPITHECUS AFRICANUS* (MAMMALIA, PRIMATES) FROM MEMBER 4, STERKFONTEIN FORMATION, TRANSVAAL

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(With 14 figures)

[*MS. accepted 11 December 1980*]

ABSTRACT

Two maxillae from the Sterkfontein fossil hominid site have been prepared. The left (Sts 70) and right (Sts 69) maxillae belong to a single juvenile individual. They occlude with the previously described 'gracile' australopithecine mandible (Sts 24). It is proposed that these three specimens, which are described here in detail, comprise a single juvenile individual. This composite specimen represents the most complete maxilla and occluding set of deciduous teeth of a juvenile australopithecine from South Africa, with the exception of the holotype of *Australopithecus africanus* Dart, 1925.

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INTRODUCTION

On 17 August 1936, Robert Broom recovered the first remains of an adult australopithecine at Sterkfontein (Broom 1936*a*, 1936*b*). Since then, excavations by Broom and Robinson over the periods 1936–1939 and 1947–1949, by Brain in 1956, by Robinson over 1957 and 1958, and by Tobias and Hughes from 1966 to the present have recovered a large number of remains of the 'gracile' australo-

Ann. S. Afr. Mus. **84** (4), 1981: 169–201, 14 figs.

pithecine, *Australopithecus africanus*, from the fossiliferous deposits of Sterkfontein. To date, the australopithecine fossils have derived solely from the lower breccia of the type site (Robinson 1952), or Member 4 sediments (Partridge 1978).

Although there are a relatively large number of adult australopithecine remains from Sterkfontein, the jaws and deciduous teeth of only eleven immature individuals have been recovered. Eight of these were found by Broom and Robinson and are housed in the collection of the Transvaal Museum (Sts 2, Sts 18, Sts 24, Sts 50/TM 1516, Sts 56, Sts 59, Sts 62 and Sts 67), the remaining three were discovered by Hughes and these are housed in the Department of Anatomy, University of the Witwatersrand Medical School (Stw 59, Stw 62 and Stw 67). None of these specimens consists of both mandibular and maxillary dentitions.

Recent work by the author on the Sterkfontein hominids revealed two specimens in the Transvaal Museum (Sts 69 and Sts 70) which required preparation and reconstruction. When cleaned, the two were found to represent the left and right maxillae and dentitions of a single juvenile individual together with the mandible and dentition of Sts 24. Together, these three specimens constitute the most complete occluding set of deciduous teeth of a single early hominid individual from South Africa, with the exception of the holotype of *A. africanus* from Taung.

The purpose of this paper is to describe in detail the gnathic parts and the dentition presented by the composite specimen, Sts 24/69/70. A comparative study of the dental morphology of this specimen will be presented in a future publication dealing with the dentitions of the South African australopithecines (Grine in prep.).

MATERIAL AND DESCRIPTIONS

Specimen Sts 69

This specimen was recovered from the Member 4 breccia in 1949 by J. T. Robinson. The description on the catalogue card reads: 'Fragmentary maxilla containing some teeth; 3 pieces.'

Prior to cleaning and reconstruction, the specimen consisted of three separate pieces of breccia with cross-sections of parts of the maxillary dentition exposed (Fig. 1). It was found that the three pieces fit together comfortably. After they were joined and the surrounding matrix was cleaned away, a reasonably well-preserved right maxilla with the dm^1, dm^2 and M^1 was exposed (Fig. 2). Also partially exposed are the crowns of the developing M^2 and $\underline{C}$; small parts of the P^3 and P^4 are visible.

Maxilla (Figs 2–3)

The right maxilla is preserved from a point just behind the lateral wall of the socket of the di^2 anteriorly. Most of the lateral surface is intact, including much of the zygomatic process. The posterior surface of the maxillary tuberosity

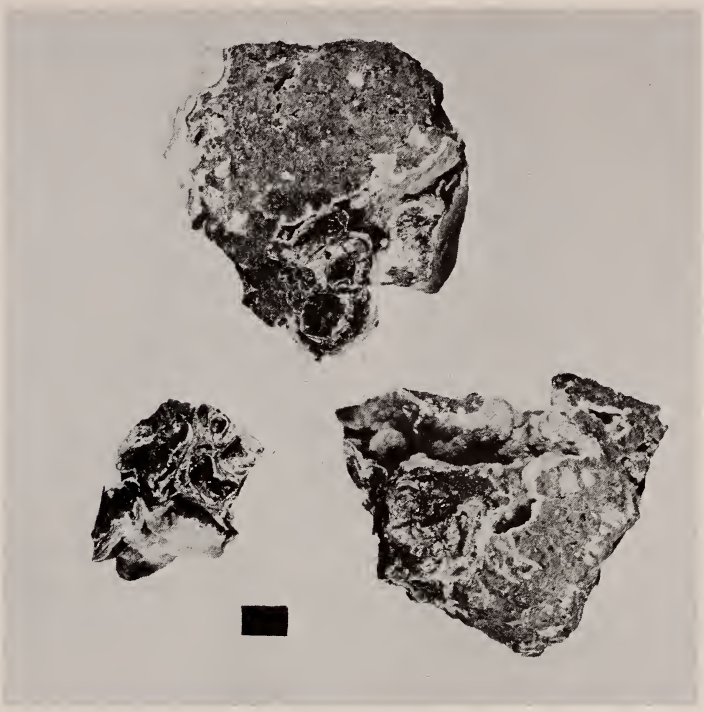

Fig. 1. Sts 69 prior to preparation and reconstruction. All three pieces of breccia contain fragments of dentition and maxillary bone. Scale in cm.

Fig. 2. Lateral view of Sts 69 after preparation. Note alveolar resorption and the separation of the tooth crowns. Scale in cm.

Fig. 3. Occlusal view of Sts 69 (left) and Sts 70 (right) in approximate anatomical alignment. Scale in cm.

is preserved superiorly, but inferiorly the bone has been broken away. Several pieces of bone have been lost from the lateral surface above the dm^1, and a part of the buccal surface of the P^3 germ is visible in one of these areas. The zygomatic process is broken away laterally so that the zygomatic bone is not present, and the exposed end of this process has been crushed slightly with a large piece of the anterior face displaced forwards. A large piece of bone has been lost from the lateral surface over the distobuccal root of the M^1. The medial, or internal surface has been severely damaged, and only a very small part of the horizontal process of the maxilla remains. Small, isolated parts of the lingual surface of the alveolar process remain intact. The crypts of the unerupted central and lateral permanent incisors are partially preserved. Part of the permanent canine germ and portions of the lingual surfaces of the premolar germs are exposed lingually. The matrix-filled socket of the d^c is preserved intact, and posteriorly a small part of the occlusal surface of the developing M^2 is visible. The dm^1, dm^2, and M^1 are well preserved. Diagenetic pressures have distorted the alveolar process slightly, so that the crowns of the deciduous and first permanent molars have been separated somewhat. Interproximal contact facets are present between these molars, but, as preserved, the crowns of the dm^1 and dm^2 are separated by about 1,3 mm and the crowns of the dm^2 and M^1 by some 1,5 mm.

Viewed from the lateral aspect, the alveolar margin is very slightly convex downwards anteroposteriorly. The margin appears to have undergone some resorption as portions of the buccal roots of the deciduous molars are visible.

The anterior surface of the zygomatic process arises at a level coincident with the mesiobuccal root of dm^2. The lowest point of the root of the process arises above the distal edge of the dm^2 crown some 5 or 6 mm superior to the alveolar margin. The anterior surface of the zygomatic process slopes posterolaterally and it is gently concave medio-laterally. Its posterior surface slopes anterolaterally, but at its preserved lateral extent this face turns sharply posteriorly. The inferior surface of the zygomatic process slopes superiorly and laterally so that this face projects inferolaterally; it follows a broad, gentle curve so that no inframalar notch is present. The root of the zygomatic process is moderately robust.

The infraorbital foramen is situated at the junction of the zygomatic process and the lateral surface of the maxilla some 18,5 mm superior to the alveolar margin at the level of the mesiobuccal root of the dm^2. Anterior to, and slightly below the infraorbital foramen the lateral surface of the maxilla shows a faint, nearly vertical bony ridge. This elevation descends on to the slight bulge formed by the developing P^3 crown. This ridge and the anterior surface of the zygomatic process define respectively the anterior and posterior boundaries of the shallow canine fossa, which is continuous with the sulcus below the infraorbital foramen. The canine jugum is weak.

Viewed inferiorly, the lateral surface of the maxilla curves gently forward and medially from the mesiobuccal root of the dm^1. The anterior wall of the d^c socket is separated from the distal wall of the di^2 socket by some 3,3 mm of bone. It is evident that the deciduous incisors were situated at a level anterior to the d^c. The external surface of the maxilla courses anteromedially from the canine socket towards the incisal region. Thus, the lateral alveolar surface follows an even, and smoothly rounded contour from the dm^1 to the incisor sockets.

Deciduous dentition (Figs 2–3).

Maxillary first deciduous molar

The dm^1 is well preserved. The crown is very nearly complete, with some enamel loss to its lingual surface and a number of fine cracks covering the lingual half of the occlusal surface.

Viewed occlusally, the crown is square in outline; this arrangement is disturbed slightly by the presence of a prominent swelling over the mesiobuccal aspect of the crown. Although the lingual half of the occlusal surface has been reduced to a large dentine basin, it is apparent from the symmetry of the crown that all four principal cusps were present and it seems that all were well developed. The protocone is judged to have been the largest cusp. The paracone is larger than the metacone. The relative size of the hypocone cannot be ascertained.

Occlusal wear is heavy. The entire lingual half of the crown has been reduced to a large, buccolingually concave dentine basin. The mesial, distal, and lingual sides of this exposure are bordered by a thin enamel rim. The dentine exposure is demarcated buccally by a relatively straight longitudinal line which transects the paracone and metacone. The paracone and metacone are worn so that no buccal demarcation between them is visible. Two rather distinct planes of wear are presented on the buccal side of the occlusal surface; these planes are separated along the main crest of the metacone. The mesial plane is the larger, and it slopes mesiolingually from the metacone across the paracone. The distal plane slopes rather strongly distolingually from the metacone across the distal marginal ridge. A small circular patch of dentine is exposed on the tip of the paracone and a smaller pit is exposed on the tip of the metacone.

Interproximal attrition appears to have been moderate mesially with the d^c, and slight to moderate distally with the dm^2. A broad (2,3 mm buccolingual; 1,7 mm high), concave, contact facet is present on the mesial surface. The facet is more strongly concave at its buccal extent, and it is situated over the upper half of the face (as preserved); its lingual border is situated approximately in the middle of the mesial surface. The mesial facet thus extends over the buccal part of this face. The distal surface presents a broad (3,9 mm buccolingual), flattened and rectangular-shaped facet. This facet is situated slightly more towards the lingual than the buccal side of the distal surface.

Occlusally, it is apparent that a small to moderate sized mesiostyle (=parastyle) was present mesial to the paracone. A shallow, narrow groove separates the paracone from remnants of the mesiostyle occlusally. The mesial marginal ridge is moderately thick and it courses on to the summit of the mesiostyle. The fovea anterior is represented by a relatively shallow, wedge-shaped transverse groove; it is broader buccally but narrows lingually to a thin groove where it ends approximately one-third of the way across the crown. The fovea is enclosed distally by the main crest of the paracone. It appears that a small distostyle (=metastyle) was present distal to the metacone. This region is worn, however, and the only indication of this accessory cuspule is a slight swelling of the buccal surface at the distal extremity of the crown. The distal marginal ridge, though worn, appears to have been somewhat thicker than the mesial marginal ridge; it is continuous up on to the distostyle. The buccal end of the fovea posterior, or talon basin, is represented by a narrow transverse groove.

Because of wear and damage there is no trace of the lingual developmental groove, if one were present originally. Also, the region of the mesiolingual face of the protocone where the Carabelli trait is usually expressed has been obliterated by wear.

The buccal surface is rather vertical, with a slight cervical enamel prominence present at the base of the metacone. The cervical enamel line extends considerably further over the mesiobuccal root than over the distobuccal root. The cervical enamel prominence above the paracone is extremely well de-

veloped, such that a rather large *tuberculum molare* is presented. The *tuberculum molare* projects both cervically and laterally as a bulbous swelling. A moderately thick crest of enamel courses vertically from the mesiostyle occlusally to blend into the lower part of the mesial end of the *tuberculum molare*. This crest is demarcated behind by a moderately deep, broad, vertical groove running from between the paracone and mesiostyle to the *tuberculum molare*. The distal half of the buccal surface possesses a large, moderately deep, V-shaped depression. The anterior border of this depression runs distocervically from just behind the tip of the paracone to a point some 2,3 mm from the cervical margin over the distobuccal root. The posterior border courses from this point to a level just distal to the tip of the metacone. The floor of this depression is flat.

The principal dimensions of the crown are as follows:

	MD diameter (as measured)	BL diameter (as measured)	BL diameter (incl. *tuberculum molare*)
Rdm[1]	8,5 mm	9,2 mm	9,6 mm

The radicular system comprises three separate roots—two buccal and one lingual. The buccal root neck is extremely low. The buccal roots are mesiodistally compressed, the mesiodistal diameters at the cervical margin being 2,9 mm and 2,6 mm for the mesiobuccal and distobuccal roots respectively. They are buccolingually elongate. The two roots diverge at a considerable angle (approximately 45°). The lingual root appears to be the most robust and it courses strongly lingually away from the crown.

Maxillary second deciduous molar

The right dm^2 is complete and well preserved. Part of the lingual root together with the adjacent alveolar bone has been broken away. A thin, calcite-filled crack runs vertically from the cervical margin across the lingual surface between the protocone and hypocone, and continues over on to the occlusal surface, in the same plane, across about half of the crown.

Viewed occlusally, the crown is very nearly square in outline. The distal border is slightly convex buccolingually. All four principal cusps are present and well developed. The protocone is the largest cusp by a considerable margin. The paracone, metacone and hypocone are nearly equal in size.

Occlusal wear is moderate. Wear is heavier lingually, with the protocone and hypocone considerably reduced in height relative to the paracone and metacone. The protocone has suffered the heaviest wear. A large, mesiodistally elongate and buccolingually concave dentine exposure is present on the tip of this cusp. The lingual side of the protocone bears two bevelled enamel facets separated along a transverse crest. The anterior facet slopes sharply mesiolingually and the posterior facet slopes sharply distolingually. The hypocone shows a large, slightly convex enamel facet that slopes mesiolingually. A moderately large, circular and concave area of dentine is exposed near the tip of this cusp. The paracone is slightly worn with an enamel facet on the mesiolingual slope of this cusp. The metacone is the least worn of all the cusps, and it shows only faint

enamel wear. Like the dm^1, this tooth displays considerable disparity in the degree of occlusal wear between the buccal and lingual sides of the crown.

Mesial interproximal contact is judged to have been slight to perhaps moderate in degree; a moderately large, flattened rectangular facet is present in the middle of this face. Contact distally with the M^1 appears to have been very slight—the mesial surface of the latter tooth possesses a moderate-sized, circular and faintly attrited facet.

Occlusally, there is no evidence of the presence of any accessory cuspules. The mesial marginal ridge has been slightly damaged adjacent to the occlusal border midway along the mesial face. It is worn, but appears to have been moderately thick. There is no trace of a fovea anterior. The distal trigon crest (=crista obliqua) is moderately well developed. It is rather thick and, though worn, it appears to have been continuous between the protocone and metacone. The distal marginal ridge is moderately thick but very low. It is thicker and higher lingually, where it arises from the distobuccal aspect of the hypocone. The ridge slopes cervically and becomes progressively thinner and lower as it proceeds buccally. The distal marginal ridge is at its lowest where it meets the distal surface of the base of the metacone, and at this point it is more shelf-like than ridge-like in form. The fovea posterior, or talon basin, is represented by a moderately deep but narrow and short transverse groove. It is restricted to the buccal half of the crown, and it drains distobuccally behind the metacone. At the base of the hypocone the lingual end of the groove turns sharply mesially where it continues between the metacone and hypocone. Although the lingual groove has been obliterated by wear, it is judged to have been continuous with the mesial limb of the fovea posterior.

The height of the lingual surface has been considerably reduced by wear. It is slightly convex occlusocervically with a faint cervical enamel prominence present. The mesiolingual surface of the protocone has been worn beyond the level at which the Carabelli trait is usually expressed, and, therefore, the presence or absence of this feature cannot be ascertained.

The buccal surface is rather flat and vertical occlusocervically; only a very slight cervical enamel prominence is present. The cervical line is horizontal. The buccal groove is represented by a short, rather narrow cleft. This surface presents no evidence of hypoplastic or perikymatous enamel.

The principal dimensions of the crown are as follows:

	MD diameter (as measured)	BL diameter (as measured)
Rdm^2	10,3 mm	10,8 mm

The radicular system consists of three separate roots—two buccal and one lingual—arranged very similarly to the roots of the dm^1. The root neck is very low buccally. The lingual root appears to have followed a somewhat more vertical course than its counterpart on the dm^1. The mesiodistal dimensions of the mesiobuccal and distobuccal roots at the cervical margin are 3,1 mm and 2,9 mm respectively.

Permanent dentition (Figs 2–3)

Maxillary first permanent molar

The crown and roots of the right M^1 are preserved. The crown is relatively complete and well preserved. Large chips of enamel have been broken away from the buccal side of the mesial face and from the cervical region of the distolingual corner. The buccal surface has suffered some slight cracking.

Viewed occlusally, the crown is square in outline. All four principal cusps are present and well developed. The protocone is the largest cusp by a considerable margin. The paracone is slightly larger than the metacone, the latter being nearly equal in size to the hypocone.

Occlusal wear is very mild. The protocone and the hypocone show faint enamel faceting; on the former this is restricted to the distal and distolingual sides of the cusp, whilst the hypocone shows a small facet on its apex. The mesial surface shows a moderate-sized, very lightly attrited interproximal contact facet. It is evident that this tooth had reached partial occlusal contact just prior to the time of death.

Although the mesiobuccal corner has been damaged, it appears that no mesiostyle was present. There is no development of accessory cuspules on the crown. The mesial marginal ridge is moderately thick but low, and it is incised in its middle by a shallow, broad groove. The fovea anterior is represented by a moderately deep, rather broad transverse groove situated symmetrically in the middle of the mesial part of the crown. It is bounded behind by a thick and high transverse crest formed by ridges from the paracone and protocone. This crest is much higher than the mesial marginal ridge. The ridges that form the transverse crest are separated by a very narrow groove—the crest from the paracone is slightly longer than that from the protocone. The trigon basin is deep and wide, and the sides of the cusps slope gently towards the bottom of the basin. The distal trigon crest is of moderate height and thickness. A shallow, narrow groove courses over its summit. The form of the distal marginal ridge resembles that shown by the dm^2. It is moderately thick but low, and it is continuous on to the distobuccal aspect of the hypocone lingually, but as the ridge courses buccally it becomes lower. It reaches only the bottom of the distal side of the metacone. The talon basin is represented by a relatively deep and broad transverse groove which is continuous with the groove separating the hypocone and metacone and the hypocone and protocone.

The lingual surface is slightly convex occlusocervically, especially over the cervical third of its height, and a moderately developed cervical enamel prominence is present. The lingual groove is deep, but it is rather narrow over the cervical portion of its length. It courses vertically for about two-thirds of the crown height where it ends abruptly. The mesiolingual and lingual aspects of the protocone display a series of grooves and enamel protuberances that represent the Carabelli trait. The mesiolingual aspect of the protocone presents a relatively deep, 2 mm long, horizontal groove which is bounded by a thin enamel ridge.

The ridge is incised by a narrow groove. There is a disparity between the planes occupied by the surface of the protocone above and the mesiolingual surface of the crown below this horizontal groove. A second groove is etched into the lingual surface; this groove, which is obliquely orientated, courses distocervically to mesio-occlusally, is some 1,8 mm long, and at its uppermost end it is separated from the distal end of the horizontal groove by about 1,5 mm of enamel. The surface of the crown cervical of this series of grooves is somewhat more expanded than the surface of the protocone above the groove.

The buccal surface is nearly flat and vertical occlusocervically. There is no indication of a cervical enamel prominence on this face. The buccal groove is very shallow and rather narrow; it extends vertically over about three-quarters of the crown height. There is no evidence of hypoplastic or perikymatous enamel on any of the crown surfaces.

The radicular system is obscured for the most part, but it appears to consist of three separate roots. The lingual root displays a marked longitudinal groove in its middle; this root may comprise two separate canals.

The principal dimensions of the crown are as follows:

	MD diameter (as measured)	BL diameter (as measured)
RM^1	13,1 mm	13,8 mm

Specimen Sts 70

This specimen was discovered by J. T. Robinson in the Member 4 breccia in 1949. The description on the catalogue card reads: 'Incomplete and crushed maxilla containing some of the milk dentition and well-formed but unerupted anterior permanent teeth.'

Prior to cleaning and reconstruction, the specimen consisted of three separate pieces of breccia containing parts of a poorly preserved maxilla and deciduous dentition (Fig. 4). The permanent central and lateral incisors were found in a separate box in the collection which was labelled as containing

Fig. 4. Sts 70 prior to preparation and reconstruction. Scale in cm.

unidentified bone fragments. It was discovered that one of the pieces of breccia contained half of the crown of a right permanent maxillary canine and this fitted perfectly on to part of the R$\underline{C}$ crown contained in the maxilla of Sts 69. However, this did not provide unequivocal evidence for the association of Sts 69 and Sts 70 because the piece might have been placed erroneously in the box containing the Sts 70 specimen. One of the pieces of breccia contained the buccal half of the crown of the Ldm^1; this was removed and fitted to the remainder of the tooth. The medial surface of the maxilla fragment was very badly eroded, and it was decided to sacrifice this part of the bone in order to extract the crowns of the developing LP^3 and LP^4.

Final preparation revealed a very badly fragmented and incomplete left maxilla containing the damaged Ld^c, Ldm^1 and Ldm^2 (Fig. 3).

Maxilla (Fig. 3)

The bone is very incomplete and comprises two pieces. The anterior of the two consists of a small piece of the anterolateral surface above the root of the deciduous canine, a small part of the lingual alveolar surface anterior to the dm^1 and medial to the d^c. This piece contains part of the crypt for the developing I^1 and a portion of the distal alveolar wall of the di^2 root. The larger piece shows the inferior root of the zygomatic process; it is broken anteriorly vertically above the middle of the dm^2 and it ends posteriorly opposite the alveolus of the distobuccal root of the M^1. A moderately large piece of what appears to be the horizontal palatal process of the maxilla is attached to the posterior piece of the maxilla by a bridge of breccia. The maxilla is too incomplete to warrant an anatomical description.

Deciduous dentition (Fig. 3)

Maxillary deciduous canine

A small part of the crown and the broken, exposed root of the left d^c are present. The crown consists only of the distolingual cervical corner. The occlusal aspect of the preserved portion of the crown is worn with a rather strong distolingual bevel; the most distal part shows a dentine exposure.

The root is single and straight. It is evident that the root had a compressed ovoid outline in cross-section, with the broadest axis mesiodistal. The buccal surface possesses a slight vertical groove.

It is not possible to obtain measurements of either the crown or the root.

Maxillary first deciduous molar

The damaged, incomplete crown and part of the radicular system of the left dm^1 are preserved. A large section of the lingual part of the occlusal surface and both the mesial and distal crown surfaces are damaged and/or missing. The lingual root remains intact but the two buccal radiculae are missing.

The degree, extent and the finer details of occlusal wear are identical to those shown by the Rdm^1 of Sts 69. The occlusal morphology of this crown, as

preserved, is identical to that displayed by the homologous tooth of Sts 69. Buccally, the *tuberculum molare* appears to be slightly more swollen and accentuated than that on the dm^1 of Sts 69, and the V-shaped depression on the buccal surface is somewhat smaller here than on the other tooth. The lingual root is similar in size and orientation to that of Sts 69.

The principal dimensions of the crown are as follows:

	MD diameter (as measured)	BL diameter (as measured)	BL diameter (incl. *tuberculum molare*)
Ldm^1.....	8,6 mm	9,0 mm	9,3 mm

Maxillary second deciduous molar

The damaged, incomplete crown and the severely damaged radicular system of the left dm^2 are present.

The buccal side of the mesial surface as well the occlusal surface of the paracone have suffered slight enamel loss. A relatively wide crack runs obliquely across the metacone on to the distobuccal corner with some slight displacement of the adjacent enamel. Another crack runs across the protocone, hypocone and the distolingual corner of the crown. This crack is narrow but some enamel has been lost from along its borders.

The degree, extent and finer details of occlusal wear shown by this tooth are identical to those evinced by the Rdm^2 of Sts 69. Also, the morphological details of the occlusal, buccal and lingual surfaces are essentially mirrored by the dm^2 of Sts 69.

The principal dimensions of the crown are estimated as follows:

	MD diameter (estimated)	BL diameter (estimated)
Ldm^2.....	10,2 mm	11,2 mm

Permanent dentition (Fig. 5)

Maxillary central permanent incisor

The isolated crowns of both the left and right I^1's are present. The crown of the left tooth is the more complete of the two. The mesial and distal halves of the LI^1 crown have been displaced slightly along a straight vertical crack through the middle of the tooth. The mesial half of the lingual cervical margin has suffered from loss of enamel. The root is only partially developed on the mesial and distal aspects of the crown. The right crown has been broken along an irregular, oblique plane from the middle of the buccal surface to the cervical margin of the lingual surface. The mesial side of the remaining part of the crown is separated slightly from the rest of the tooth by a slightly curved vertical crack.

The mesial corner of the incisal edge is rather sharply angulated, whilst the distal one is more smoothly curved. The incisal edge of the right crown has a single, small mammelon in its middle with the edges mesial and distal to it flat and horizontal. The lingual aspect of this edge shows several very faint vertical grooves. The incisal edge of the left crown, however, shows some four small mammelons from the mesial edge to the middle; the distal half of this edge is rather flat and horizontal in disposition.

Fig. 5. Permanent dentition associated with Sts 70. Scale in cm.

The labial surface is slightly convex incisocervically over its incisal half; the cervical portion is rather flat and vertically inclined. There is no cervical enamel prominence present. A number of faint, irregular vertical grooves cover most of the labial surface. Viewed from the labial aspect, the crown is nearly rectangular in outline. Its height is greater than its mesiodistal diameter. The cervical region is only slightly tapered, so that the mesiodistal diameter at the incisal margin is just slightly greater than that cervically.

Lingually, the mesial marginal ridge is faintly developed, and this only over the incisal third of the crown. The distal marginal ridge is slightly thicker and shows more relief than the mesial marginal ridge. Approximately at mid-crown height the distal marginal ridge blends imperceptibly into the basal or gingival swelling. This prominence is rather well developed, and although it is symmetrical, the distal portion is somewhat more swollen than the mesial end. Two central vertical ridges arise from the basal prominence. The mesial of these ridges is thin and low and the distal, which arises from the more swollen part of the basal prominence, is somewhat better developed and longer than the mesial. On the left crown the mesial of the two central ridges is represented by two, thin parallel crests; and the distal ridge is better developed than on the left tooth. The lingual surface is slightly concave mesiodistally and moderately concave incisocervically.

The principal dimensions of the crowns are as follows:

	MD diameter (as measured)	BL diameter (as measured)	Height (as measured)
LI^1	10,0 mm	—	—
RI^1	10,0 mm	8,5 mm	14,4 mm

Maxillary lateral permanent incisor

The isolated crowns of the left and right I^2's are present. The crown of the left tooth is well preserved and very nearly complete, but it has suffered some slight damage to the lingual cervical margin. A small piece of alveolar bone is attached to the base of the mesial surface of this crown. The right tooth is more damaged than the left. A small chip of enamel has been lost from the incisal edge and a large, wedge-shaped section of the crown has broken away from the lingual surface. The cervical enamel margin has been damaged round the entire periphery of the crown. A small piece of alveolar bone is attached to the base of the distal surface of this tooth. Neither tooth possesses any trace of the root.

The mesial end of the incisal edge is somewhat rounded, but it is considerably sharper in appearance than the distal end, which exhibits a long, gentle curvature. The incisal edge is notched slightly mesial to its middle, and the mesial portion is both shorter mesiodistally and higher than the distal part. A single, faint mammelon is developed at the distal end of the incisal notch.

The labial surface is only faintly convex incisocervically. Viewed from the labial aspect, the crown is somewhat rectangular in outline—its height exceeds its mesiodistal diameter. The cervical portion of the crown is slightly narrower mesiodistally than the incisal part. The labial surface displays several faint, irregular vertical grooves. Along the mesial border of this face, a faint vertical ridge courses incisally for most of the crown height from the cervical region.

Lingually, the mesial and distal marginal ridges are moderately well developed. They are narrow and low incisally, where they blend into the lingual surface some 2 or 3 mm short of the incisal edge. The ridges become progressively thicker and higher as they course cervically. The cervical swelling or prominence is damaged. The mesial and distal marginal ridges follow a convergent course cervically where they are separated by a relatively deep but narrow groove. It is not possible to determine whether these ridges remained separate up to the cervical line or whether they joined to form a single basal prominence. No median ridge development is present. The lingual surface is rather flat incisocervically and slightly concave mesiodistally.

The principal dimensions of the crowns are as follows:

	MD diameter (as measured)	BL diameter	Height (estimated)
LI^2	6,5 mm	—	10,0 mm
RI^2	6,9 mm	—	—

Maxillary anterior premolar

The isolated crown of the left P^3 is present. The specimen is represented by an apparently incompletely developed crown with slight damage to parts of the cervical margin. Root development had not been initiated at the time of death. However, it is apparent that the crown was almost fully developed; perhaps some enamel would have been added to the buccal and lingual cervical margins.

Viewed from the occlusal aspect, the crown is ovorectangular in outline, with the buccal and lingual sides rounded and the buccolingual axis longer than

the mesiodistal. The two principal cusps are present. The buccal cusp is considerably larger than the lingual. The apex of the buccal cusp is situated approximately midway between the mesial and distal ends of the crown, the mesial slope of this cusp is sharp whilst its distal aspect is more inflated in appearance. The lingual cusp is lower and areally smaller than the buccal cusp, and it is situated mesial to the mid-crown transverse axis which bisects the buccal cusp. The shorter mesial part of the lingual cusp is rather sharp, and its distal aspect is thickened.

The mesial marginal ridge is extremely low. It is higher and slightly thicker lingually where it arises from the tip of the lingual cusp. It loses height as it courses bucally till it meets the base of the buccal cusp, where it is represented by a flat shelf. The fovea anterior is represented by a broad, flattened surface which is bounded posteriorly across its buccal half by a well-developed crest from the buccal cusp.

Two well-developed crests from the buccal cusp, and a single, moderately well-developed ridge from the lingual cusp are separated by a deep but narrow longitudinal groove which traverses the mid-crown longitudinal axis.

The distal marginal ridge is thick at its buccal and lingual extremes, but is low and relatively thin in its middle. Where the ridge joins the lingual cusp a short, thick crest courses buccally. Distal to the buccal cusp, the distal marginal ridge supports a short, mesiolingually directed crest. The fovea posterior, which is larger than the fovea anterior, is represented by a relatively deep basin.

The lingual surface is slightly convex occlusocervically, and it is well rounded mesiodistally.

The buccal surface is flat occlusocervically, the cervical portion being lateral to the occlusal part of this face. The mesial and distal aspects of the buccal face are indented by rather deep vertical grooves. The mesial groove is broader occlusally, and cervically it narrows to a relatively deep cleft; it ends abruptly just above the cervical enamel margin. The distal groove is longer than the mesial one, and it courses vertically from the posterior aspect of the buccal cusp to near the cervical margin. It is bounded behind by a prominent vertical enamel crest.

The principal dimensions of the crown are as follows:

	MD diameter (as measured)	BL diameter (as measured)
LP^3	9,1 mm	12,4 mm

Maxillary posterior premolar

The badly damaged and incomplete, immature crown of the left P^4 is present. Only the occlusal portion of the buccal cusp and the mesio-occlusal part of the lingual cusp are present. The distolingual quadrant of the crown has been badly distorted and damaged. No trace of any radicular formation, if any were present at the time of death, is presented.

It is evident that the buccal cusp is considerably larger, both areally and in height, than the lingual cusp. The buccal cusp appears to be situated so that its

tip is coincident with the mid-crown transverse axis of the crown. The lingual cusp is situated mesial to the buccal cusp, in the mesiolingual quadrant of the crown. A moderate-sized, incompletely separate cuspule occupies the mesial border of the buccal cusp. The mesial marginal ridge is like that of the P^3 in form; it rises high on to the lingual cusp but ends at the base of the buccal cusp (more particularly, at the base of the mesiobuccal cuspule). The fovea anterior is represented only by a broad, flattened and buccally sloping shelf. It is bounded distally by crests from the buccal and lingual cusps. These crests are separated in the middle of the crown by a deep, narrow longitudinal groove.

The buccal surface, as preserved, presents the tip of what appears to have been a moderately well-developed mesial enamel ridge. The ridge arises occlusally as a relatively thin crest opposite the junction between the buccal cusp and the mesiostyle. After a short distance the crest broadens considerably; it is demarcated mesially by a V-shaped depression and distally by a moderately deep groove. There is no evidence of the presence of a distal buccal groove.

Because of damage, no measurement of the dimensions of this tooth can be recorded.

Specimens Sts 69/Sts 70 composite (Figs 3, 6–7)

The left and right maxillae, Sts 69 and Sts 70, and their associated teeth are considered to belong to the same individual for several reasons. Firstly, as mentioned above, the fragment of the permanent canine associated originally with Sts 70 was found to fit perfectly the RC crown contained in the Sts 69 maxilla. Secondly, there is very close correspondence of the morphological features of the dm^1 and dm^2 of the two specimens (Figs 3, 7), and the dimensions of these teeth are nearly identical. Thirdly, the degree, extent and details of the patterns of occlusal wear between the deciduous molars in the two maxillae are identical. Fourthly, the right permanent central and lateral incisors associated originally with Sts 70 fit snugly into the remnants of the corresponding crypts in Sts 69 (Fig. 6). More particularly, the small piece of alveolar bone attached to the RI^2 crown corresponds in size and outline to an area of bone

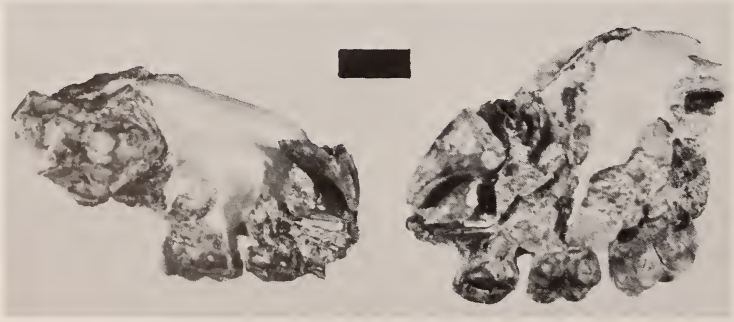

Fig. 6. Medial view of Sts 70 (left) and Sts 69 (right) with the permanent incisors placed in their crypts. Scale in cm.

that is missing from the lateral wall of the lateral permanent incisor crypt in the Sts 69 maxilla. Finally, the state of preservation and the coloration of the enamel of the deciduous molars (and permanent incisors) contained by the two specimens are very much alike.

The two reconstructed maxillae with the permanent incisors placed in their crypts are shown in Figure 7 in near anatomical position.

Specimen Sts 24

This specimen was recovered from the lower, or Member 4, breccia by Broom and Robinson on 11 March 1948. It consists of the badly damaged alveolar portion of a mandibular corpus with the left deciduous incisors, the left and right deciduous canines and first molars, the right second deciduous molar and the right first permanent molar (Fig. 8). Broom & Robinson (1950) extracted the developing crowns of the right permanent central incisor, the right and left lateral permanent incisors and the right anterior premolar from the mandible.

Additional preparation was performed on this specimen in order to expose the lingual aspects of the deciduous and permanent molars and the right mandibular corpus, and the alveolus of the Rd_C (Fig. 9). In addition, the crown of the LP_3 and the damaged, incomplete crown of the RP_4 were removed from the bottom of the mandible.

The deciduous and permanent teeth contained in this mandible have been briefly described and figured by Broom & Robinson (1950) and Robinson

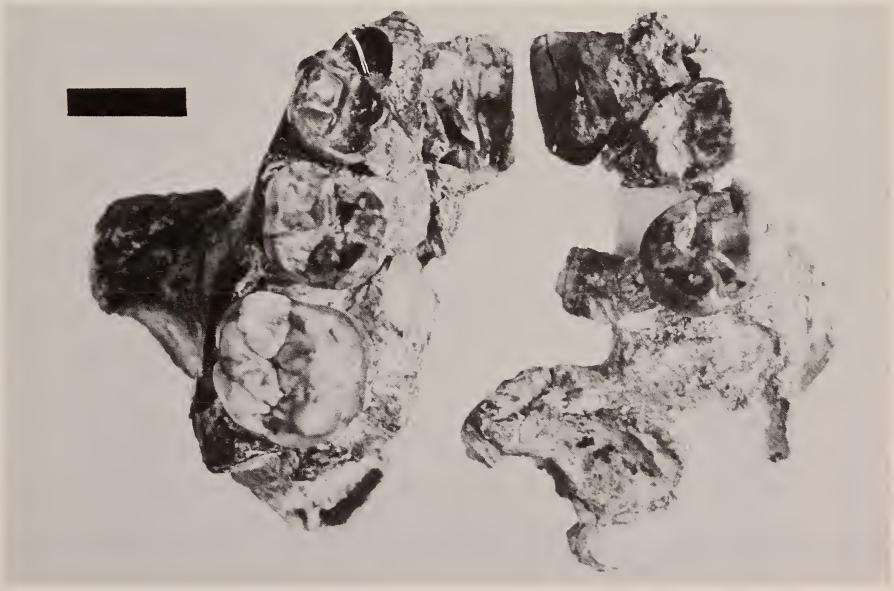

Fig. 7. Occlusal view of the Sts 69/Sts 70 composite with permanent incisors in their crypts. Arranged in approximate anatomical position. Specimen now catalogued as Sts 24a. Scale in cm.

Fig. 8. Occlusal view of Sts 24 prior to further cleaning.
Scale in cm.

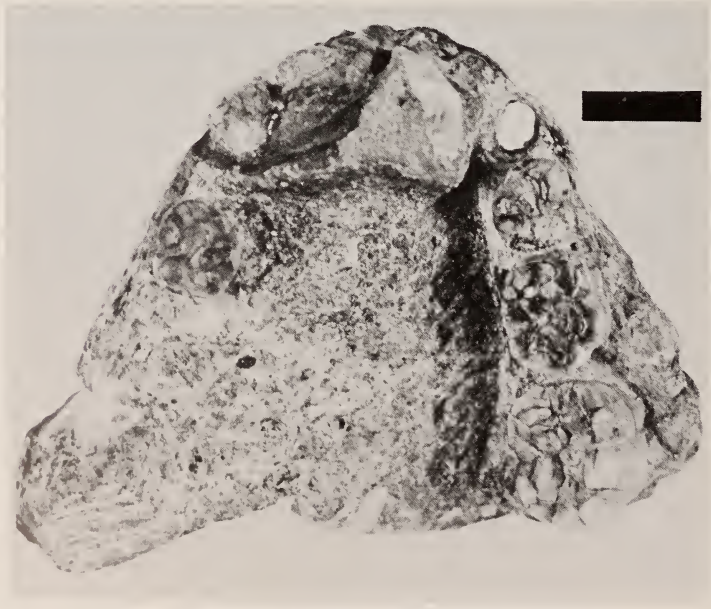

Fig. 9. Occlusal view of Sts 24 after further cleaning.
Scale in cm.

(1956). The following is a list of descriptive text pages and figures of these teeth in the aforementioned publications.

BROOM & ROBINSON (1950)

Descriptive text

specimen	*page*
Mandible	42
di_1	50
di_2	51
d_C	51
dm_1	51–54
dm_2	54–55
I_1	42
I_2	43
P_3	43–45
M_1	45

Illustrations

specimen	*figure*	*page*
di_1 buccal view	15A	42
di_2 buccal view	15B	42
d_C buccal view	15C	42
di_1–d_C anterolateral view	plate 3 (fig. 14)	
dm_1 buccal view	15L	42
dm_2 buccal view	15K	42
dm_1–M_1 occlusal view	17C	50
dm_1–M_1 occlusal view	plate 4 (fig 18)	
I_1 buccal view	15D	42
I_1 lingual view	15E	42
I_1 mesial view	15F	42
I_2 buccal view	15G	42
I_2 lingual view	15H	42
I_2 distal view	15I	42
P_3 buccal view	15M	42
P_3 distal view	15N	42
P_3 occlusal view	15O	42
M_1 buccal view	15J	42

ROBINSON (1956)

Descriptive text

specimen	*page*
di_1	130
di_2	130
d_C	132–133
dm_1	136–137
dm_2	141–142
I_1	36
I_2	37–38
M_1	104–106

Illustrations

specimen	*figure*	*page*
dm_1 buccal view	39b	136
dm_1 occlusal view	38b	135
I_1 lingual view	10b	38
I_2 lingual view	10c	38
M_2 occlusal view	30b	105

Although these teeth have been described briefly and illustrated elsewhere, they will be described in detail and figured here for completeness.

Deciduous dentition (Figs 9–12)

Mandibular central deciduous incisor

The worn crown and intact root of the left di_1 are present. The lingual surface of the tooth is covered by matrix.

The incisal edge is moderately worn with a slight mesiolingual slope. This edge shows a large dentine exposure which is rimmed by a thin enamel wall. The height of the crown appears to have been reduced considerably by wear. The labial surface is very faintly convex incisocervically, there being no cervical enamel prominence at all. This surface is smooth, and the cervical portion of the crown appears to have been tapered so that the mesiodistal diameter of the incisal edge would have been greater than that at the incisal margin.

Broom & Robinson (1950) recorded the mesiodistal diameter of the extant crown as 4,1 mm; Robinson (1956) measured it as 4,2 mm and estimated that this dimension of the unworn crown would have been about 4,7 mm. The height of the crown was recorded as 4,0 mm by Broom & Robinson (1950) and as 3,4 mm by Robinson (1956). The dimensions of the crown, as recorded by the present author, are as follows:

	MD diameter (as measured)	MD diameter (est. original)	BL diameter	Height (as measured)	Height (est. original)
Ldi_1	4,2 mm	4,4 mm	—	3,7 mm	?

The root is elongate and appears rather large relative to the size of the crown. It courses straight downward for most of its length, with the apical third tapering and sloped slightly mesially. The root is some 20,8 mm long and it measures mesiodistally some 3,0 mm at the cervical margin.

Mandibular lateral deciduous incisor

The badly damaged crown and the complete root of the left di_2 are preserved. The Rdi_2 is represented only by a small part of the lingual enamel surface and a broken root which is embedded in its socket.

When cleaned originally, the crown of the left incisor was 'perfectly preserved except that the top of the crown is a little worn (Broom & Robinson 1950: 51). Later, Robinson (1956: 130) recorded that the 'crowns of the lateral incisors are too damaged for either measurement or description'.

At present, the crown of the Ldi_2 is missing a large chip of enamel from the mesiolabial aspect and the entire upper portion has been broken away along a plane that slopes steeply cervically from mesial to distal. The root is complete, but only the mesiolabial aspect is exposed.

Fortunately, the labial aspect of the complete crown was illustrated in a drawing by Broom (Broom & Robinson 1950, fig. 15B) and in a photograph (Broom & Robinson 1950, plate 3 (fig. 14)). It is evident from these figures that the crown had a somewhat rectangular outline, and it appears that wear was moderate. The incisal edge was somewhat convex, with a short mesially sloping part and a longer and more steeply sloping distal bevel. It is evident also that a faint to slightly developed enamel crest rose vertically from the cervical margin

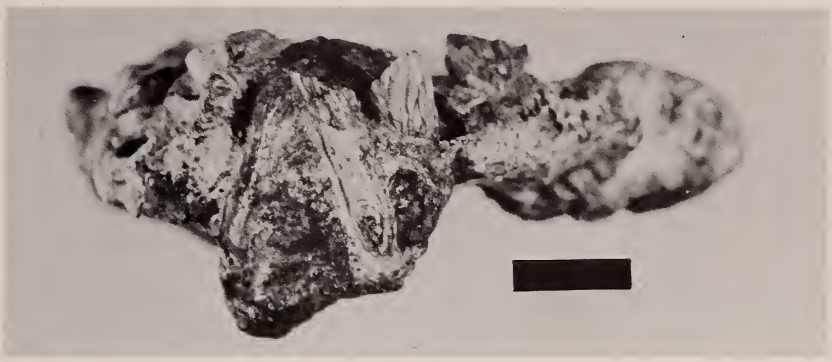

Fig. 10. Buccal view of deciduous incisors and canine of Sts 24. Scale in cm.

Fig. 11. Lingual view of Rd_c of Sts 24. Scale in cm.

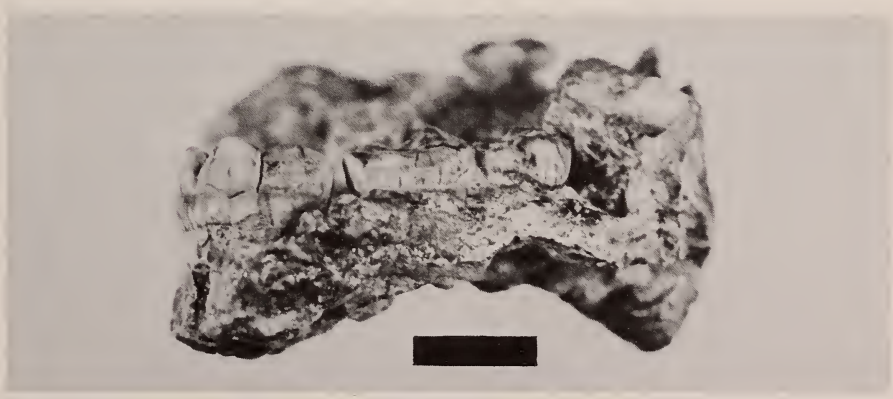

Fig. 12. Buccal view of right deciduous and first permanent molar of Sts 24. Scale in cm.

Fig. 13. Isolated permanent teeth of Sts 24. Scale in cm.

along the distal end of the labial face to the incisal edge. The buccal face is nearly flat and vertical incisocervically, and a cervical enamel prominence is not present.

The crown appears to have been considerably larger than that of the di_1. Although no measurements can be recorded for the crown, Broom & Robinson (1950) determined the mesiodistal diameter as being 5,5 mm and the height (worn) as 6,7 mm. Because of damage, no measurements of the crown can be made now.

The root is moderately robust, elongate and straight. The length of the root measures some 11,2 mm, and its mesiodistal diameter at the cervical margin is approximately 3,5 mm.

Mandibular deciduous canine

Both the left and right deciduous canines are represented. The left d_c is represented by a damaged crown and the Rd_c consists of a damaged crown and root. The crown of the Ld_c is preserved in anatomical position, whilst the Rd_c has been dislodged from its alveolus—the crown and the upper half of the root are isolated, and the lower half of the root is attached by its lingual aspect to matrix.

Originally, the crown of the Ld_c was 'perfect except for a little wearing' (Broom & Robinson 1950: 51). The buccal view of the Ld_c is illustrated in a drawing by Broom (Broom & Robinson 1950, fig. 15C) and in a photograph (Broom & Robinson 1956, plate 3 (fig. 14)). Inasmuch as Robinson (1956) recorded the dimensions of this tooth, it would appear that it was complete until that date at least. However, at present the distolingual quadrant of the crown is

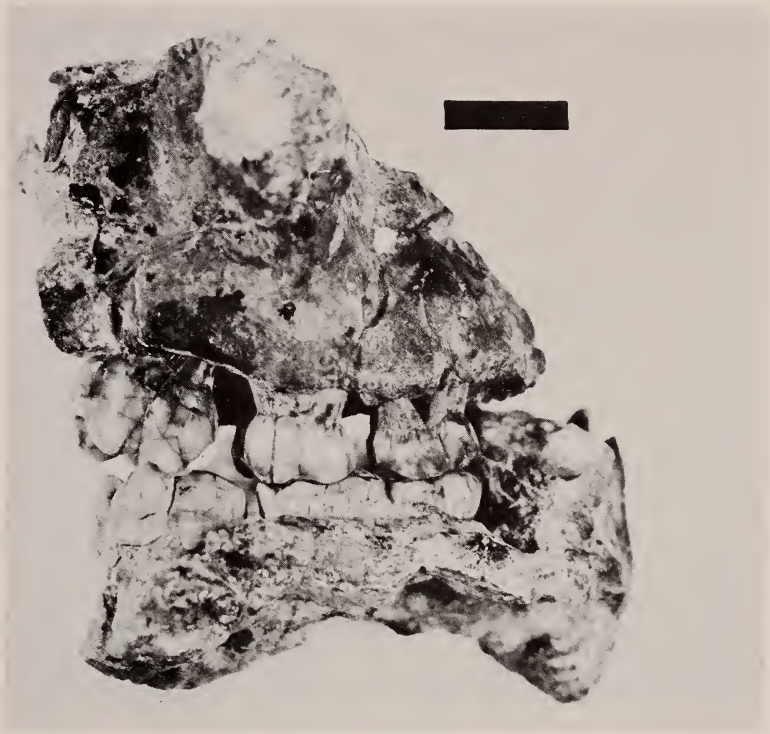

Fig. 14. Lateral view of occlusal relationship between Sts 69 and Sts 24. Note that the upper molars have been separated by postmortem diagenetic pressure, whilst the mandibular teeth are still in approximal contact. Scale in cm.

missing. It has been cracked round its entire periphery near the cervical margin with some loss of enamel (Fig. 10). The crown of the Rd_c is nearly complete except for a vertical strip of enamel over the mesial half of the buccal surface. It has a longitudinal crack through the tip.

Viewed from the buccal aspect, the crown is somewhat diamond-shaped with a high, central cuspal tip and the mesial and distal ends surmounted by smaller accessory cuspulids. The mesial cuspulid is situated higher than the distal cuspulid. The buccal face is moderately to markedly convex mesiodistally, but it is rather flat occlusocervically except for the upper fifth of the crown, which is slightly curved. A cervical enamel prominence is not present. The buccal face mesial to the central cusp shows a faint V-shaped depression which is bounded anteriorly by a very slight enamel ridge which courses nearly vertically along the mesial edge of this surface. Occlusally, this ridge is continuous with the mesial cuspulid. A larger depression is situated distal to the main cusp, and this hollow is bounded distally by a slight enamel crest which courses obliquely upwards from the cervical margin to blend into the distal cuspulid. A narrow, vertical strip of hypoplastic enamel is present on the right crown.

Occlusal wear is slight in degree—it is very slightly heavier on the right crown. The tip has been reduced somewhat in height, and it shows a well-developed enamel facet with a strong lingual slope. A small patch of dentine is exposed on the lingual aspect of the tip of the Rd_c, whilst there is barely a trace of dentine exposure on the left crown. A flattened enamel facet with a strong lingual slope is present along the lingual aspect of the mesio-occlusal edge from the tip to the mesial cuspulid. The cuspulid has been more heavily worn (and it is slightly damaged) on the right crown. From the tip, a broad, somewhat concave enamel facet runs down the distal side of the central cusp on to the distal cuspulid, where the facet is somewhat more horizontally disposed. The distal enamel facet slopes neither lingually nor buccally.

Lingually, a moderately well-developed cervical swelling is present. This swelling is skewed distally, i.e. it is considerably more prominent over the distal half of the lingual face than over the mesial (Fig. 11). A very faint cervical enamel prominence is developed over the distal moiety. The mesial marginal ridge is of moderate thickness and height, but it is short. It courses down from the mesial cuspulid (where it is most strongly developed) to blend imperceptibly into the mesial part of the lingual face. The distal marginal ridge is somewhat more strongly expressed than the mesial, and it courses from the distal cuspulid to the cervical swelling. A moderately deep depression is situated between the median and mesial marginal ridges. The depression between the median and distal marginal ridges is considerably deeper than the mesial groove.

The dimensions of the lower canine (side unstated) were given by Broom & Robinson (1950) as: MD, 7,0 mm; height, 7,8 mm; estimated original height, 8,5 mm. Robinson (1956) recorded the following measurements for the two crowns: left: MD, 6,4 mm; BL, 5,6 mm; height, approximately 7,6 mm; right: MD, 6,3 mm; BL, 5,6 mm; height, approximately 6,6 mm. He estimated the original height for both crowns as about 8,0 mm.

The following measurements were recorded for these two specimens by the present author:

	MD diameter (as measured)	BL diameter (as measured)	Height (as measured)	Height (est. original)
Ld_c	—	—	7,6 mm	7,8 mm
Rd_c	6,4 mm	5,7 mm	6,8 mm	7,7 mm

Mandibular first deciduous molar

The right and left first deciduous molars are represented. The right crown is complete and well preserved; the crown of the left tooth is nearly complete, with slight damage to the buccal surface.

Viewed from the occlusal aspect, the crown has a somewhat irregular, ovorectangular outline (Figs 8–9). Although the crown is worn, it is evident that at least four principal cusps are present. The protoconid appears to be the largest cusp by a considerable margin. The metaconid is well developed. The hypoconid is rather heavily worn, but it appears to have been well developed also, and probably about the same size as the metaconid. The entoconid, which

is worn also, is judged to have been somewhat reduced in size and is most certainly the smallest of the four cusps. Wear has obliterated all occlusal detail on the distal and especially distobuccal parts of the crown, and it is, therefore, not possible to ascertain with certainty whether a hypoconulid was present. The general appearance of this region of the crown indicates that a hypoconulid was probably not present, or, if present, it would have been extremely small.

Occlusal wear is moderate to heavy in degree. The left tooth is slightly more heavily worn than the right. Cuspal height has been considerably reduced, and, in general, the occlusal surface shows a distobucally directed wear bevel. The protoconid shows a nearly flat, slightly buccally sloping wear face. A large, longitudinally elongate, ovoid dentine patch is exposed on the protoconid. The mesial end of the protoconid shows a small enamel facet (and a small dentine pit) which slopes slightly mesiobuccally. The distal end of the protoconid dentine patch is confluent with a very large hypoconid dentine exposure via a narrow isthmus; on the left crown this bridge is slightly broader. The hypoconid is covered entirely by a large, deeply concave dentine basin. This exposure is nearly triangular in shape and it continues distolingually across the crown on to the entoconid. The metaconid is the least heavily worn cusp. On the right tooth it shows a flattened enamel facet which slopes distobuccally, and on the left crown a moderate-sized dentine patch is exposed on a larger facet of similar disposition. The talonid has been reduced to a nearly flat plane, interrupted only by the dentine exposures.

Interproximal wear mesially appears to have been very slight, with only a tiny facet presented near the occlusal margin of this surface. Contact with the dm_2 distally is moderate, with a very broad, flattened plane of wear.

The mesial marginal ridge is represented by a moderately thick but low enamel crest which courses downward distolingually from the mesial end of the protoconid. The distal extremity of this ridge is considerably lower than its buccal origin, and the distolingual end is separated from the base of the mesial face of the metaconid by a narrow groove. The fovea anterior is represented by a Y-shaped groove that is both narrow and shallow. The two tines of the Y abut the lingual face of the protoconid, whilst the stem of the Y is represented by a groove between the mesial marginal ridge and the base of the protoconid. The fovea anterior is situated on the mesiolingual part of the crown, it slopes and drains lingually, and it is bounded distally by the bases of the protoconid and metaconid. It appears that these two cusps were connected by a moderately high and thick transverse ridge, the distal trigonid crest, which was incised by a shallow but broad groove. The floor of this groove, however, is considerably higher than the floor of the anterior fovea.

The lingual surface is slightly to moderately convex occlusocervically, at least over the metaconid, and a cervical enamel prominence is not present. The lingual groove is restricted to the occlusal surface where it is well developed, but the lingual face is interrupted between the metaconid and entoconid.

The buccal surface comprises two rather distinct faces—those of the pro-

toconid and hypoconid. The hypoconid surface appears to be slightly convex occlusocervically, with no development of a cervical enamel prominence. The buccal face of the protoconid is considerably larger than that of the hypoconid, and it courses downward for a considerable distance beyond the level of the hypoconidal cervical line (Fig. 12). The cervical enamel margin below the protoconid continues down over the mesiobuccal aspect of the mesial root plate below the level of the radicular bifurcation, and this margin is convex downward. Also, the cervical portion of the protoconid face projects laterally beyond the level of the hypoconid surface. A moderately well-developed cervical enamel prominence is present below the protoconid. The upper part of this surface is rather flat, sloping outwards as it courses downward. The buccal groove is represented by a small, shallow depression near the occlusal margin, between the protoconid and hypoconid.

Although little of the radicular system is exposed, it is evident that it is comprised of divergent mesial and distal root plates.

Broom & Robinson (1950) recorded the dimensions of the dm_1 crown of Sts 24 as measuring: MD, 8,2 mm; BL, 7,3 mm. Robinson (1956) measured the mesiodistal and buccolingual dimensions of the right crown as 8,2 mm and 6,9 mm respectively. The left crown is, as mentioned above, slightly damaged, whilst the right tooth is complete. The dimensions of these specimens, as determined by the present author, are as follows:

	MD diameter (as measured)	MD diameter (est. original)	BL diam. trigonid (as measured)	BL diam. talonid (as measured)
Ldm_1	8,3 mm	8,5 mm	(7,3) mm	(6,9) mm
Rdm_1	8,2 mm	8,4 mm	7,2 mm	6,9 mm

Mandibular second deciduous molar

The well-preserved and very nearly complete crown of the right second deciduous molar is present. The only damage that this tooth has suffered is the loss of enamel (a moderately large chip) from the buccal surface of the protoconid.

Viewed from the occlusal aspect, the crown is nearly rectangular in outline; the distobuccal corner is angled somewhat by virtue of the placement of the hypoconulid. All five principal cusps are present and well developed. Occlusal wear is moderate, and it has reduced the cusps in height so that their relative sizes are somewhat obscured. It appears that the metaconid was the largest cusp, followed in decreasing order of size by the protoconid, hypoconid, entoconid, and hypoconulid.

Occlusal wear has reduced the buccal cusps to a nearly flat, horizontal plane, whilst the metaconid and entoconid retain fairly high, sharp tips. Wear is heaviest on the mesiobuccal quadrant of the crown, where the protoconid has been reduced to a large, ovoid and rather deeply concave dentine exposure. The mesial end of the occlusal surface has been worn flat and a very narrow, transverse dentine strip here is continuous with the protoconid dentine exposure. The hypoconid displays a somewhat smaller, ovoid and concave patch of

dentine. The hypoconulid has been reduced to a low, rounded hump with a small dentine pit on its tip. The entoconid shows a large, concave enamel facet. The metaconid, which is the least heavily worn of all, shows two enamel facets. Neither lingual cusp shows any dentine exposure.

Interproximal contact mesially with the dm_1 is, as mentioned above, moderate. A small, flattened distal facet indicates slight interproximal contact with the first permanent molar.

Although occlusal wear has obliterated much of the morphological detail, it is evident that a broad metaconid–hypoconid contact is present. The metaconid extends distally beyond the level of the protoconid, thus, the mesiobuccal groove is situated mesiad of the level of the lingual groove. The primary fissure pattern is arranged in a rather symmetrical Y-shaped configuration. The distal marginal ridge appears to have been relatively narrow. It is low and deeply incised in its middle. The fovea posterior is represented by a small pit which is bounded mesially by the postentocristid, which is higher (even though worn) than the distal marginal ridge.

The lingual surface is very slightly convex occlusocervically, and a cervical enamel prominence is not present. The lingual groove is very short and narrow.

The buccal surface is, at least over the remaining cervical portion of its height, slightly more convex occlusocervically than the lingual face. The mesiobuccal groove is represented by a shallow, narrow and vertical fissure which ends rather abruptly a few millimetres above the cervical margin. The distobuccal groove is considerably less well developed than the mesiobuccal, and it is represented by a short, shallow depression. Numerous, very tiny hypoplastic pits cover much of the buccal surface of the hypoconid.

The principal measurements of this crown were determined by Broom & Robinson (1950) as: MD, 10,8 mm; BL talonid, 9,0 mm. Robinson (1956) measured the same dimensions of the specimen as: MD, 10,7 mm; BL talonid, 9,0 mm. The present author has recorded the following measurements for this tooth:

	MD diameter (as measured)	MD diameter (est. original)	BL diam. trigonid (as measured)	BL diam. talonid (as measured)
Rdm_2	10,8 mm	10,9 mm	8,8 mm	9,0 mm

Permanent dentition (Figs 8–9, 12–13)

Mandibular central permanent incisor

The complete, well-preserved crown and a short segment of the root of the unerupted right I_1 are present. A bit of enamel has been damaged on the distocervical aspect of the buccal face and along the distal cervical margin.

The mesial and distal corners of the incisal edge are rather sharply angulated, and both of these extremities are surmounted by moderately large, sharp mammelons. The incisal edge is horizontal. It supports some five mammelons, of which the two end and the median, or central, are moderately large, whilst the other two are slightly smaller.

Viewed from the labial aspect, the crown has a tapered outline with the mesiodistal width considerably greater at the incisal edge at than the cervical margin. The labial surface is slightly convex incisocervically, and it appears that no cervical enamel prominence is present. The upper two-thirds of the labial face is covered by numerous faint perikymatous lines.

Lingually, there is a moderately well-developed, centrally or symmetrically situated basal swelling. This swelling does not support a tubercular structure. The mesial and distal margin ridges are faintly developed over the incisal third of this face, and a median ridge is not present. The lingual face is moderately concave incisocervically but flattened mesiodistally.

Broom & Robinson (1950) recorded the following measurements of the crown: MD, 6,2 mm; BL, 6,3 mm; height, 11,8 mm. Robinson (1956) obtained the following measurements: MD, 6,3 mm; BL, 6,1 mm; height, 11,7 mm. The present author has determined the measurements of this crown as:

	MD diameter (as measured)	BL diameter (as measured)	Height (as measured)
RI_1	6,2 mm	6,1 mm	11,6 mm

Mandibular lateral permanent incisor

The nearly complete crowns of both the left and right teeth are preserved. A short segment of developing root is attached to both crowns.

The right tooth is cracked along a plane which transects the lingual cervical margin and cuts through the cervical third of the buccal face, and a relatively large chip of enamel has broken away from the labial surface at the level of this crack. The left crown is complete and undamaged.

The mesial corner of the incisal edge is considerably higher than the distal. The mesial end is very slightly rounded and it is surmounted by a rather large mammelon. A relatively deep cleft at the distal end of this mammelon separates it from a very large, mesiodistally elongate central mammelon which dominates the incisal edge. The central mammelon is highest mesially and it slopes downward to its distal end where a sharp groove separates it from a moderately sized mammelon at the distal extremity of the incisal edge.

The labial surface is very slightly convex incisocervically. A cervical enamel prominence is not present. Viewed from this aspect, the crown is tapered in outline, with the mesiodistal diameter greater incisally than cervically. On the left crown, a slightly elevated, moderately thick crest of enamel runs up the distal edge of the labial face from approximately 4,0 mm above the cervical line to just below the distal mammelon.Both the upper and lower extremities of this ridge blend gradually into the labial face. On the right crown the same ridge is only very faintly demarcated.

Lingually, a rather prominent basal swelling is present, and there is no cervical enamel prominence. The basal swelling is centrally or symmetrically situated and it does not support a tubercular structure. The mesial marginal ridge is only slightly developed, and it runs downward from the mesial mammelon and terminates just above the basal swelling. The distal marginal ridge is

somewhat more elevated and thicker than the mesial, and it courses from the distal mammelon and terminates just above the basal swelling. The lingual surface is moderately concave incisocervically, but relatively flat mesiodistally.

Broom & Robinson (1950) recorded the following measurements for this tooth (side not stated): MD, 7,3 mm; height, 13,0 mm. Robinson (1956) reported the dimensions of this tooth (side not stated) as: MD, 7,3 mm; BL, 6,8 mm; height, 13,0 mm. The principal dimensions of these crowns, as recorded by the present author, are as follows:

	MD diameter (as measured)	BL diameter (as measured)	Height (as measured)
LI_2	7,4 mm	7,0 mm	12,6 mm
RI_2	7,3 mm	7,0 mm	12,5 mm

Mandibular anterior premolar

The nearly complete, well-preserved crowns of both the left and right P_3's are present. In both cases the cervical margins lingually (LP_3) and mesiolingually (RP_3) have suffered post-mortem damage. This damage is somewhat more severe on the right crown. The buccal cervical margins of the crowns appear to be incompletely formed—it is judged that only a short segment of enamel would have been deposited here—but otherwise the crowns are evidently completely formed. In fact, a short segment of root is present along the distal aspect of the left tooth. The two crowns are nearly identical in morphological detail. Broom & Robinson (1950: 44) provided a very brief description of this tooth, but Robinson (1956) considered it to be incompletely developed and therefore did not include it in his sample of Sterkfontein premolars.

Viewed from the occlusal aspect, the crown is somewhat trapezoid in outline. The buccal side of the crown is considerably longer mesiodistally than the lingual side, and whilst the distal edge follows a nearly straight transverse course, the mesial border slopes distally from buccal to lingual. The crown is dominated by a very large buccal cusp and a considerably smaller lingual cusp.

The buccal cusp extends from the front of the crown nearly to the distal end, where it is separated by a deep cleft from a moderately well-developed distostylid at the buccal extremity of the distal marginal ridge. The tip of the main buccal cusp is situated approximately midway between the mesial and distal sides of the crown, and relatively sharp crests course mesially and distally from its summit. A well-developed bifurcating crest runs distolingually from the tip of the buccal cusp.

The lingual cusp is somewhat lower and much smaller in area than the buccal cusp. It is situated on the mesiolingual quadrant of the crown and its tip is displaced mesial to the mid-crown transverse axis which bisects the buccal cusp. A moderately thick cingulum surrounds the distolingual aspect of the base of the lingual cusp. This cingulum arises from the lingual aspect of the lingual cusp's tip and slopes downward to form a low, broad shelf. A slight median ridge, which drops swiftly, and a sharp distal crest course from the tip of the lingual cusp.

A small accessory cuspulid is present at the mesial end of the buccal cusp. This cuspulid is incompletely separated from the main buccal cusp and it represents the buccal extremity of the mesial marginal ridge. The mesial marginal ridge comprises a buccal part from the mesial accessory cuspulid and a lingual part from the lingual cusp; these crests course downward and converge at the middle of the mesial aspect of the crown, where the mesial marginal ridge is the same height as the floor of the fovea anterior.

The fovea anterior is represented by a moderately large basin which is completely enclosed distally by a transverse ridge formed by the crests from the buccal and lingual cusps. This ridge is shallowly incised in its middle by a narrow groove.

The distal marginal ridge, which is moderately thick, descends from the tip of the distostylid to the distal side of the base of the lingual cusp. At its lingual extremity the ridge supports a small cuspulid. The ridge continues round the distolingual side of the lingual cusp as a cingulum. The fovea posterior, which is completely enclosed by the distal marginal ridge and the median transverse ridge, is represented by a relatively large, deep basin.

The lingual surfaces on both crowns are damaged. The buccal surface, in so far as it is developed, is rather flat, sloping outwards occlusocervically. The mesial portion of this face shows a shallow depression bounded mesially by a slight, vertical enamel crest which ends occlusally in the mesial accessory cuspulid. Distally, a moderately expressed vertical ridge rises to the distal cuspulid. This ridge is separated by a relatively deep groove from the remainder of the buccal surface.

Broom & Robinson (1950) recorded the mesiodistal diameter of the crown as 9,4 mm and the incompletely developed buccolingual diameter as 10,1 mm. Further development would have added enamel to the buccal and lingual cervical margins, but the mesiodistal dimension would probably have been unaffected. The dimensions of these two crowns, as determined by the present author, are as follows:

	MD diameter (as measured)	BL diameter (as measured)	BL diameter (est. complete)
LP_3	9,4 mm	10,1 mm	?
RP_3	9,3 mm	10,0 mm	?

Mandibular posterior premolar

The immature and incomplete crown of the right P_4 is present. As preserved, the crown consists only of part of the buccal and lingual cusps and the fovea anterior. It is evident that the buccal cusp is larger than the lingual, which is situated mesiad of the mid-crown transverse axis which bisects the buccal cusp. An incipient mesiobuccal accessory cuspulid is present at the mesial extremity of the buccal cusp. The mesial marginal ridge is very low; it forms a shelf-like extension of the floor of the fovea anterior.

It is not possible to record any useful measurements for this specimen.

Mandibular first permanent molar

The complete, well-preserved crown and part of the radicular system of the right M_1 are present.

Viewed from the occlusal aspect, the crown is nearly rectangular in outline. All five principal cusps are present and well developed. The metaconid is judged to be the largest cusp, followed very closely in size by the protoconid. The hypoconid and entoconid, which are nearly equal in size, are slightly smaller than the trigonid cusps, and the hypoconulid is the smallest cusp.

It is evident that this tooth had just reached occlusal contact with the M^1 at the time of death. Occlusal wear is restricted to a slight, flattened facet on the tip and mesial aspect of the protoconid.

The mesial marginal ridge is extremely low and for most of its length it is no higher than the floor of the fovea anterior. Several very small cuspulids are present in the middle of the mesial aspect of the fovea. The fovea is represented by a relatively large, flat depression bounded distally by a rather thin, low transverse crest between the metaconid and protoconid. This crest is deeply incised by a very narrow groove.

A moderately broad metaconid–hypoconid contact is present. The lingual groove is situated slightly distal of the level of the mesiobuccal groove, and thus the Y pattern formed by the main occlusal fissures is not symmetrically disposed.

The distal marginal ridge is very poorly developed. It is represented by a slight crest from the tip of the hypoconulid which courses cervically over the distal surface of the crown. The fovea posterior is represented by a small pit which continues over on to the distal surface of the crown as a short, narrow vertical groove. The postentocristid is low but moderately thick; it is incised by a deep and narrow groove.

The main crests of the metaconid, entoconid and hypoconid bifurcate or trifurcate, imparting a slightly crenulate appearance to the occlusal surface.

The lingual surface is rather flat and is nearly vertical occlusocervically. The lingual groove is narrow, and extends vertically over about half the height of the crown. A cervical enamel prominence is not present.

The buccal surface is slightly convex occlusocervically, especially over the upper half of its height. A very slight cervical enamel prominence is apparent. The mesiobuccal groove is deep and courses vertically over about two-thirds of the crown height. It ends abruptly. The distobuccal groove is deep; it is rather broad but shorter than the mesiobuccal groove. The distobuccal groove also ends abruptly. A flattened area is present on the buccal aspect of the protoconid, and this region is bounded below by a flat enamel shelf. No evidence of perikymatous or hypoplastic enamel is shown by either the buccal or the lingual surfaces.

Broom & Robinson (1950) recorded the dimensions of this crown as: MD, 13,3 mm; BL, 11,3 mm. Robinson (1956) measured it as being: MD, 13,1 mm; BL, 11,2 mm. The principal measurements of this tooth, as measured by the present author, are as follows:

	MD diameter (as measured)	BL diam. trigonid (as measured)	BL diam. talonid (as measured)
RM_1	13,3 mm	11,3 mm	11,2 mm

Specimens Sts 24/69/70 composite

The reasons for associating the Sts 69 and 70 maxilla have been discussed. Equally strong evidence exists for associating these two specimens with the mandible and dentition represented by Sts 24. Firstly, the state of preservation, the colour, and the staining of the enamel of the teeth contained in the maxillary and mandibular specimens are very similar. Secondly, the developmental status and eruption of the permanent teeth in these specimens are compatible with their having derived from a single individual. Thirdly, the general occlusion of the deciduous and first permanent molars of the Sts 69 and Sts 24 specimens is very good (Fig. 14). The two upper and two lower deciduous molars do not afford a simultaneous precise fit because the maxillary molars have been spread apart through diagenetic deformation, whilst the lower molars still remain in approximal contact. However, the occlusal relationships between the individual molars are excellent. Finally, the degree, pattern and details of occlusal wear between the corresponding upper and lower molars are too close for this to be a chance association.

Besides adding several well-preserved and complete deciduous and permanent teeth to the collection from Sterkfontein, this specimen provides the most complete maxilla of an australopithecine child from South Africa, save for the Taung skull. Finally, this composite specimen represents the only associated and occluding maxillary and mandibular cheek teeth of a 'gracile' australopithecine child from Sterkfontein. In fact, this specimen provides the most complete associated gnathic and dental remains of a juvenile australopithecine from South Africa, apart from the Taung skull.

The mandibular specimen and its associated teeth retain its original catalogue number, Sts 24, whilst the numbers of the two maxillary fragments (Sts 69 and Sts 70) and their associated teeth have been changed—together they are now referred to as Sts 24a.

ACKNOWLEDGEMENTS

I am grateful to Drs C. K. Brain and E. S. Vrba for permission to further prepare and describe specimens in their care. This paper benefited from the comments and advice of Drs T. D. White and B. A. Wood. Mr A. R. Hughes and Mr H. Thackwray assisted with photography. This work was supported by a grant from the Senate Research Committee, University of the Witwatersrand.

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